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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,466	08/25/2003	Jason A. Janesky	CML00378CR	5085

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FREESCALE SEMICONDUCTOR, INC.  
LAW DEPARTMENT  
7700 WEST PARMER LANE MD:TX32/PL02  
AUSTIN, TX 78729

EXAMINER
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NGUYEN, THINH T

ART UNIT	PAPER NUMBER
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2818

DATE MAILED: 10/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/648,466

☒ Applicant(s)

JANESKY ET AL.

Examiner

Thinh T Nguyen

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on 28 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

Art Unit: 2818

## DETAILED OFFICE ACTION

1. Applicant's election of claims 1-14 without traverse for prosecution of the Application in the communication with the Office on September 28<sup>th</sup> 2004 is acknowledged

### Specification

2. The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant cooperation is requested in correcting any errors of which the applicant may become aware in the specification.

### Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 1-2 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

#### REGARDING CLAIM 1,2

The recitation --" **improved material quality** "-- make those claims indefinite

Art Unit: 2818

since it is not possible to know what material quality improvement limitations the applicant want to talk about because there are a multitude of material improvement in semiconductor fabrication. Are they electrical? mechanical ? magnetic? chemical? cost-effective? Better micro-miniaturization? A person of ordinary skill in the art will not know what material to choose to make use of the invention.

### **Claim Rejections - 35 USC § 102**

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102(b/e) that form the basis for the rejections under this section made in this office action.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

To expedite the prosecution of the case, the Examiner assumes in the limitation --**“ improved material quality”**-- of claim 1 and 2, Applicants want to claim that the magnetic layer will improve the electrical and magnetic quality of the device.

Art Unit: 2818

6. Claim 1, 6-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Parkin et al. (U.S. Patent 6,166,948) or under 35 U.S.C. 102(e) as being anticipated by Savtchenko (US patent 6,545,906).

#### REGARDING CLAIM 1

Parkin et al. (fig 3A, the title, the abstract) disclose a multi-state, multi-layer magnetic memory device comprising: a nonmagnetic spacer region (fig 3A layer 22) with a surface and an opposed surface; a free magnetic region (fig 3A layer 10, column 6 line 24) positioned adjacent to the surface of nonmagnetic spacer region, the free magnetic region including and a plurality of magnetic layers; wherein a free magnetic layer positioned adjacent to the surface of the nonmagnetic spacer region in the plurality of magnetic layers has improved material quality.

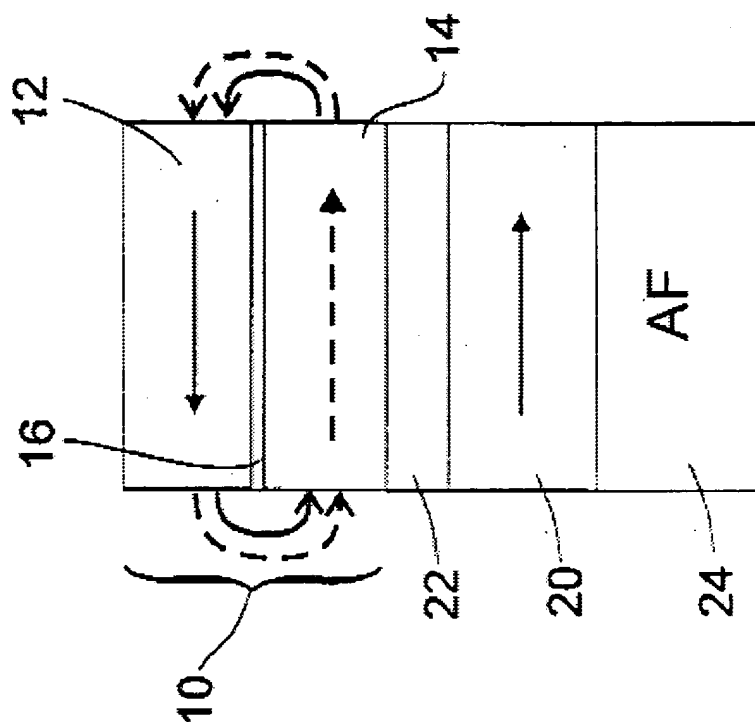
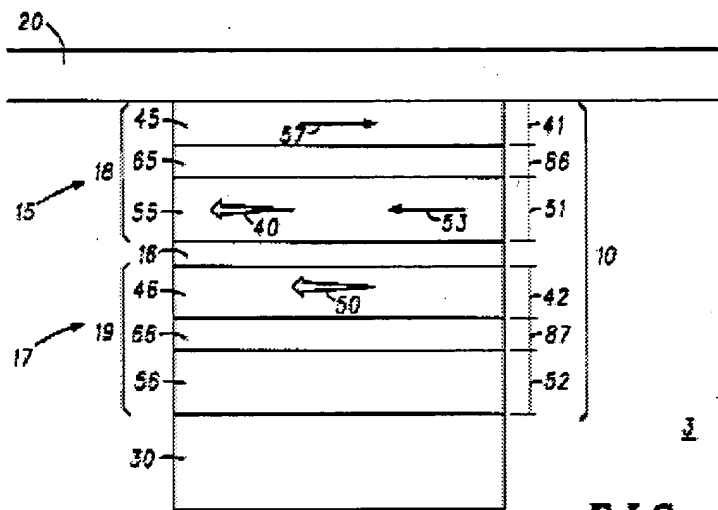


Fig. 3A

Similarly, Savtchenko et al. (fig 1, free layer 15, column 2 lines 31-33, the abstract, spacer 16) disclose the same invention.



**FIG. 1**

#### REGARDING CLAIM 6

Parkins et al (fig 3A, layer 16, the abstract) disclose a magnetic memory device wherein the free magnetic region includes at least one layer of an anti-ferromagnetic coupling spacer material.

Similarly Savtchenko et al. (fig 1, column 2 line 38-47) disclose the same invention.

#### REGARDING CLAIM 7

Parkins et al. (the abstract, fig 3A, column 7 line 50) disclose a magnetic memory device wherein the anti-ferromagnetic coupling spacer material includes at least one of copper (Cu), chromium (Cr), or ruthenium (Ru).

Art Unit: 2818

Similarly, Savtchenko et al. (claim 28, column 6 line 2) disclose the same invention.

#### REGARDING CLAIM 8

Parkins ( the abstract, fig 3A, column 7 line 49) disclose a magnetic memory device wherein the free magnetic region includes at least one of nickel (Ni), iron (Fe), cobalt (Co).

Similarly, Savtchenko et al. (fig 1, free layer 15, column 5 lines 54-56, the abstract) disclose the same invention.

#### REGARDING CLAIM 9

Parkins ( the abstract, fig 3A free region 10 ) disclose a magnetic memory device wherein the free magnetic region includes a synthetic anti-ferromagnetic material region including N ferromagnetic layers which are anti-ferromagnetically coupled where N is a whole number greater than or equal to two.

Similarly, Savtchenko et al. (fig 1, free layer 15, the abstract) disclose the same invention.

#### REGARDING CLAIM 10

Parkins (the abstract, fig 3A free region 10) disclose a magnetic memory device wherein each N ferromagnetic layer is anti-ferromagnetically coupled by sandwiching a layer of an anti-ferromagnetic coupling material ( fig 3A layer 16) between each adjacent ferromagnetic layer in the N ferromagnetic layers.

Similarly, Savtchenko et al. (fig 1, free layer 15, the abstract) disclose the same invention.



Art Unit: 2818

## REGARDING CLAIM 11

Parkins (the abstract, fig 3A) disclose a magnetic memory device wherein a fixed magnetic region ( fig 3A, layer 20) is positioned on the opposed surface of the nonmagnetic spacer region.

Similarly, Savtchenko et al. (fig 1, layer 46, the abstract) disclose the same invention.

7. Claim 5, 12,14 are rejected under 35 U.S.C. 102(b) as being anticipated by Parkin et al. (US Patent 6,166,948).

The examiner noted that claim 5 is a hybrid product by process claim, for the recitation of the limitation: -- "the plurality of magnetic layers is deposited or annealed at temperatures greater than 100C. "-- **This limitation is taken to be a product by process limitation and considered non-limitation.** In a product by process claim, it is the patentability of the claimed product and not of the recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product by process claim, a rejection based on sections 102 or 103 is fair. The Patent Office is not equipped to manufacture products by a myriad of processes put before it and then obtain prior art product and make physical comparisons therewith. In re Brown, 173 USPQ 685 (CCPA 1972). Also, a product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 (CCPA 176). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ

Art Unit: 2818

289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a "product by process" claim, and not the patentability of the process. See also MPEP 2112.01 and MPEP 2113.

Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above caselaw makes clear.

#### REGARDING CLAIM 5

Parkin et al. (fig 3A, the title, the abstract) disclose a magnetic memory device wherein the magnetic layer positioned adjacent to the surface of the nonmagnetic spacer region in the plurality of magnetic layers is deposited.

#### REGARDING CLAIM 12

Parkin et al. (fig 3A, the title, the abstract, column 4 line 50) disclose a magnetic memory device wherein the non magnetic spacer region is aluminum oxide

#### REGARDING CLAIM 14

Parkin et al. (fig 3A, the title, the abstract) disclose a magnetic memory device wherein the one ferromagnetic layer ( fig 3A layer 14) of the synthetic anti-ferromagnetic material region that is positioned adjacent to the surface of the nonmagnetic spacer is at least as thick as any of the other N ferromagnetic layers ( fig 3A layer 12) which comprise the synthetic anti-ferromagnetic material region.

Art Unit: 2818

8. Claim 13 is rejected under 35 U.S.C. 102(e) as being anticipated by Sakakima et al. (US patent 6,567,246).

**REGARDING CLAIM 13**

Sakakima et al. (fig 7B, layer 5B, column 3 lines 45-50, column 18 lines 39-40) disclose a multi-state, multi-layer magnetic memory device comprising: a nonmagnetic spacer region with a surface and an opposed surface; a free surface of the magnetic region positioned adjacent to the nonmagnetic spacer region, the free magnetic region including a plurality of magnetic layers; wherein a free magnetic layer positioned adjacent to the surface of the nonmagnetic spacer region in the plurality of magnetic layers has improved material quality and wherein the nonmagnetic spacer is a conductive material including at least one of copper (Cu), chromium (Cr), silver (Ag), and gold (Au).

**Claim Rejections - 35 USC § 103**

9. The following is a quotation of U.S.C. 103(a) which form the basis for all obviousness rejections set forth in this office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Parkin et al. (U. S. patent 6,166,948) in view of further remark.

## REGARDING CLAIM 2

Parkins et al. (fig 3A, the abstract) disclose all the invention except for specifying the thickness of the magnetic layer adjacent to the non magnetic layer. This feature, however, is considered obvious since it has been held that when the general condition of a claim is disclosed in prior art discovering the optimum or workable range involves only routine skill in the art.

11. Claims 3, 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parkin et al. (U. S. patent 6,166,948) in view of Slaughter et al. (US patent 6,205,052)

## REGARDING CLAIM 3,4

Parkins et al. (fig 3A, the abstract) disclose all the invention except is silent about the magnetic layer positioned adjacent to the surface of the nonmagnetic spacer region in the plurality of magnetic layers is of a material having improved growth characteristics on the nonmagnetic spacer or of amorphous material.

Slaughter et al. (claim 2, fig 4 layer 28 "", column 7 line 7-8) teach how to make a amorphous free layer that promote growth characteristics, It would have been obvious to one of ordinary skill in the art the time the invention was made to complement the teachings by Parkins et al. with the teachings by Slaughter et al. in order to come up with the invention of claim 3 or 4

The Rationale is as the following:

A person skilled in the art at the time the invention was made would have been motivated to reduced the topological coupling between the free magnetic layer and the

Art Unit: 2818

fixed layer as suggested by Slaughter et al. in their abstract to improve the device invented by Parkins.

12. When responding to the office action, Applicants are advised to provide the examiner with the line numbers and the page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

13. A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to be abandoned (see M.P.E.P. 710.02(b)).

### **CONCLUSION**

14. The prior arts made of record and not relied upon are considered pertinent to applicant disclosure: Gill (US patent 6,600,184) discloses a system and method for improving magnetic tunnel junction sensor magnetoresistance

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thinh T Nguyen whose telephone number is 571-272-1790. The examiner can normally be reached on Monday-Friday 9:00am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached at 571-272-1787.

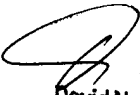
Art Unit: 2818

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Thinh T. Nguyen *TTN*

Art Unit 2818

  
David Nelms  
Supervisory Patent Examiner  
Technology Center 2800